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COST AND MANAGEMENT

Control of Electrical Power Cost

By H. R. HATCHER
Canadian Westinghouse Company, Ltd.

(Before Toronto Chapter, October 17, 1932)

It is indeed a privilege and a pleasure to have the opportunity of addressing this association and my hope is that some matter of interest and value may be brought to your attention.

When I received the invitation I was more or less surprised to find an association called the "Canadian Society of Cost Accountants and Industrial Engineers" in existence. Speaking from the industrial engineer's point of view, I would say that you are to be congratulated in having an association made up of cost accountants and industrial engineers, for the reason that cost accountants usually, and from personal experience, always are more or less a bane to the existence of the industrial engineer. I recall in early days in the steel industry, the industrial engineers, whose business it is to look around and effect every economy possible, devoted a good deal of their attention to the conservation and putting to useful work waste gases from the furnaces. The engineers decided to somewhat change the order of things and instead of having smoke stacks vertical, laid them horizontal and waste gases were thus conducted to internal combustion engines to furnish mechanical and electrical power in the plant. This work had scarcely been completed when the cost accountants came around and as a result we found that waste gases were actually costing us money. So that I say you are to be congratulated on having joined together, in one association what may appear to some of us two radical factions. Your speaker, therefore, is more firmly convinced than ever that the world is getting better and presents a very, very hopeful future.

Those of us who are following scientific pursuits realize that science still holds many unknowns. No doubt a great many of you have listened to Floyd Gibbons broadcasting his series of talks on what he saw and learned at the General Electric Laboratory. Floyd Gibbons attempted in a very few minutes to rattle off what he had seen and been told in this house of wonder. This in a way reminds me of a laboratory experiment I once saw with a cockerel. Some sort of an operation was performed at one end of the cockerel and the other end was put through a stuffing process so that the cockerel developed weight so fast that he was not even able to give vent to his feelings in the usual rooster way. At any rate, he was so well stuffed that he could not crow about what had taken place. Not so with Floyd Gibbons,—he still talked.

Speaking from the electrical man's point of view, so many things have happened in the last few years, so many theories have been exploded and new ones advanced that it behooves the engineering profession of today to be everlastingly on their toes in order to keep abreast of the time, and if we are to be of real service to industry, must weigh every problem presented very carefully before making any definite conclusion, and not do as my friend Mr. C. R. Smith of the Goodyear Co. often says, throw up a smoke screen, indulge in a lot of complicated mathematical equations and use language

only understood by a very few in another profession. The idea I have in mind in coming before you is to, as far is my limited knowledge will permit, give you a practical talk on this subject as I know it.

"Hydro" Development Reviewed

Your Chairman has very kindly made a reference to my early connection with Hydro. Any efforts that I may have put forth in the early days of Hydro as a municipal and industrial representative were a pleasure and since this great organization has a material bearing on power cost and particularly the first heading, namely purchased power versus local power plant, I would like to give you a little early history of Hydro developments. I would put the Hydro situation, in so far as development is concerned, into three periods. The first period, 1906 to 1914, was practically all devoted to establishment, organization and the securing of a supply of power. The early birth of Hydro took place in the town of Berlin, now Kitchener, where a number of municipal representatives gathered to discuss this great plan. Shortly after this Berlin meeting one Adam Beck, a box-maker from London, came into the picture. His dynamic energy lent impetus to the movement. The result was the formation of the Ontario Hydro Electric Power Commission, who contracted for a block of power and in turn sub-let parcels of this block power to the municipalities, who again sold it to their consumers at cost.

The period of 1914 to 1918, may be termed an emergency period. I do not wish to infer that Hydro was not completely organized during this period, but I feel it was still in development and when the war came on, were so well organized and so resourceful that they were able to supply power sufficient to meet such a great emergency. It was during this period that Chippewa was built, a master piece of engineering and Hydro generated power.

The period 1918 to the present time, 1932, has been one of expansion and development far beyond the dreams of the early pioneers in this project. Hundreds of urban municipalities have been connected and several thousand miles of rural lines have been built with the result that demands for power have consistently increased. The Ontario Hydro Electric Power Commission have kept abreast of the demand by securing power sites and contracting for blocks of power from developments already established. Coincident with this huge success there has been during this period a good deal of sniping and head hunting by some politicians.

Setting of Rates

The Ontario Hydro Electric Power Commission have compiled a standard interpretation of rates which apply in all municipalities served. These rates are based on the cost of power whether generated or purchased, transmission losses, operation, maintenance and depreciation of the system, proportionate share of capital charges covering equipment necessary to bring the power at high voltages to the point of distribution to the municipality. The municipality buys power on a peak load basis at a rate fixed by the Hydro Electric Power Commission to cover the items before mentioned. The municipality in turn provides sub stations, to receive the power, local transmission lines, transformers, meters, etc., and their rate to the consumer is made on a maximum demand or peak load basis and in their local billing this is designated as a service charge. There are usually three rates covering the integrated watthour use of this maximum demand. It is very difficult to create a load in any industry with a load factor of 100%. Provision has been made for this in the

rate, in that the first fifty hours use of the maximum demand is charged at one rate, and the second fifty hours at a lower rate, and the balance or diversity at still a very much lower rate. Assuming a month of 250 working hours, the 100 hours use of maximum demand works out to an assumed load factor of 40%, or putting it another way with this system of rating, the local system share the system diversity factor with the consumer. Now in order for the consumer to use purchased power, it is necessary to invest capital sufficient to receive the power through protective devices and to make, whatever power he buys, the correct potential value required for the work he wishes to perform. Opportunity is offered industrial engineers and cost accountants, production managers, etc., to control their load and take full advantage of this diversity power available, but more will be said of this later on in the talk and we can leave the sub section, "purchased power" and deal with the advantages of the "local power plant".

From the foregoing, it will be noticed, there are several factors common to both purchased and locally generated power. These are, demand, load factor and diversity. In setting up a local plant it is necessary to provide sufficient equipment to meet the power demand. In order to effect maximum economy, load factor must be maintained at a high level, so that greatest efficiency can be obtained from the equipment. The costs that go into making up the cost of purchased power all appear against the local power plant with at least one exception and that is, there may be in the plant a use for low pressure steam for processing or heating, which would appear as a by-product. Another factor which may enter into the local power plant for consideration, is the availability of fuel by-products which can be utilized for producing steam to operate turbines or engines. There may be waste gases, by-product gas, alcohol or other combustible materials that can be used in internal combustion engines for the production of power. My experience has been that each industrial plant presents some distinct conditions which affect power cost. There are instances where we know the local power plant cannot compete at all with purchased power. Then there are others where purchased power cannot compete with the local power plant.

Types of Contract

In making contracts for purchased power, a complete survey of plant conditions should be made and as before mentioned, a contract made which will best suit the conditions peculiar to the plant. Reference has already been made to the standard interpretation of rates by the Ontario H.E.P.C. By this system there are several classes of power that can be purchased, namely, ten hour restricted power, ten hour unrestricted power, twenty-four hour restricted power and twenty-four hour unrestricted power and off peak power. A contract for unrestricted power supply provides for a service charge to cover the System's capital investment and is based on the maximum demand. The first fifty hours' use of the maximum demand in K.W. hours is charged at a rate in Toronto of .01½c. per K.W. hour. The second fifty hours use at ¾c. per K.W. hour. All the balance is billed at 4/10c. per K.W. hour and is subject to 10% discount for prompt payment.

A contract for restricted power is one that provides for the supply of power during certain restricted periods. These periods may be at a time when either the local or the district system are at peak. The same system of billing applies, as is the case with

unrestricted purchase to which the usual prompt payment discount applies, and an additional discount on account of restriction. It is obvious that in making a power contract plant load conditions and production requirements must be carefully considered.

Load Factor and Load Control

In order to take advantage of opportunities offered in the standard form of power contract as we know it, load factor stands out as the important factor to be considered. This load factor can be controlled in several ways. There are on the market several devices known as the peak load controls. These devices can be made to sound an alarm or open switches to cut off load, and thus lower the maximum demand. Another method that is very often applied, especially in those plants where by-product fuel is available is by means of an auxiliary generating plant to take over peak loads. We all appreciate the necessity of operating equipment at its highest efficiency. This not only applies to the matter of purchased power, but to local generating equipment. Where auxiliary power plant is being used to control peak, the generating unit or units, should be chosen of capacity to operate at full or nearly full load.

Economies in power cost can be obtained by load control. The graphic chart will show the effect when analyzed. Take for instance, a graphic chart which without load control operating, shows a peak of 1,200 KVA. for a period slightly over ½ hour, occurring about 10 o'clock in the morning. We find on the same chart about 3 o'clock in the afternoon, a similar peak occurring. The interval between these two peaks is an irregular line indicating about 900 KW. There is on this chart 300 KW. that can be picked up and put to useful work for several hours of the day The next graphic chart shows load control operating. In this particular case electrical heaters are being used for annealing. The load control is set for a maximum of 1,200 KW. and immediately this point is reached the control operates, cutting off portions of the annealing oven until 1,200 KW. is held almost constant, then as the load tapers down, the control commences to cut in heaters, to pick it up, so that instead of the irregular 900 KW. line being shown, the line more closely approaches the 1,200 KW. line and useful work has been performed in the low demand period, and the time for the processing which has been done by this off peak power, has been only slightly extended. We have a chart showing almost an ideal condition without load control. This happens to be a textile plant where production controls the load. Each process depends on another and thus produces a regular and straight power line over the whole chart, excepting the shut-down period at noon hour and shift change time. These charts all show the value of high load factor.*

Equipment

Under the heading of, "Types of Electrical Equipment", I will attempt to describe various types of power apparatus and their applications. Where direct current is used, we find several types of motors, each having their own peculiar application. For instance, a series motor is a high torque motor, used for elevators, hoisting and some types of machine tools. This type of motor is used only for intermittent service and it is necessary to use a form of control to limit speed, usually of the resistance type, to prevent the motor running away when load is removed. Shunt wound motors

* Several charts were used in illustrating this address, but space does not permit their reproduction here.

are used for various tool applications, and the speed of these is controlled by resistance type rheostat used in the shunt field circuit. Shunt motors operate at constant speed on constant load, but have a tendency to slow down when heavier loads are applied. To offset this, a series field winding is introduced and we have what is known as a compound wound motor. This motor operates at constant speed on varying loads. The fields are so connected that when current, due to increased load flows in the series field, "bucks" the shunt field causing it to weaken, the motor to pick up or hold it's speed constant. These motors lend themselves to all applications where constant speed is required, such as wood-working and metal working machinery and many others.

Alternating current equipment can be classified as synchronous motors and induction motors. Induction motors are either of the squirrel cage type or the wound rotor type.

Dealing with synchronous motors first, the usual design consists of a stationary part or stator designed for alternating current with a wind grouped to provide poles to fix speed at which to operate and the moving or rotating part, usually called the rotor or field, is designed for direct current and with poles equal to the stators. These motors require the field to be separately excited from a direct current source, usually connected to the shaft of the motor. The advantage in using this type of machine is that regardless of load applied, it operates at or better than unity power factor, depending on the value of the field current applied. The synchronous motors are known as constant speed motors, their speed only varying with the frequency of the system supplying power. The speed of a four pole, 3,000 alternations or 25 cycle machine, would operate at a speed of 750 Rpm. The formula for finding speed of this type of equipment, is frequency divided by the poles, equal Rpm. In this case, 3,000 alternations divided by 4 equals 750. If it were operating on a 60 cycle circuit, which is 7,200 alternations the speed of the 60 cycle, 4 pole machine would be 7,200 divided by 4, equals 1,800 Rpm.

Synchronous motors are usually applied to large drives, such as air compressors, blowers and slow moving applications, and machinery operating at varying loads where underloading is characteristic. This is desirable since the synchronous motor runs at unity power factor at full load and leading power factor at fractional loads with the same field setting. These machines are very desirable where low power factor exists in a plant to correct power factor in the system.

I do not intend to discuss at any length, power factor, in lieu of this would refer you to bulletin H-7037, which deals very thoroughly with this subject.

Under the heading, "Induction Motors", the stationary or stator, is similar in design to that of the synchronous motor. The winding is arranged in definite pole and phase groups. The rotating part is made up of a similar series of windings, grouped in similar number of poles and phases, whose terminals are brought out to collector rings to make the wound rotor type, or a winding which consists of copper or other conductive bars set in slots in the rotor and terminated in short circuiting rings at either end of the iron section to make the squirrel cage induction motor. Each type of induction motor has it's own application. Wound rotor motors are used where heavy loads are to be started and high starting currents are objectionable, or where it is desired to vary the speed of the motor, such as required for hoisting, or variable speed machine tool application.

The speed in these wound rotor motors is controlled by inserting resistance in the rotor circuits. All types of induction motors are rated at about 5% less than synchronous speed for a given number of poles. This is due to the slip created by the load. The squirrel cage type induction motor is used for constant speed drive and is not intended for variable speed use unless provided with windings that can be grouped into a various number of pole combinations. Then a constant speed is fixed by the number of poles in the group being used. For instance 25 cycle motor having pole groups brought out so that 2 poles, 4 poles or 8 poles could be utilized. In the first instance you have a speed of 1,450 Rpm. approximately, 725 Rpm. for the 4 pole layout, and using the 8 pole group a speed of 360 Rpm. approximately. Some squirrel cage induction motors are designed for starting on full voltage and are called line start motors. The other type are designed to start on reduced voltage by an auto transformer arrangement.

Applying induction motors to any drive it is desirable that a motor be selected with a rating as close as possible to the demand required. Induction motors as other electrical apparatus operates at its highest efficiency, and highest power factor, at or near full load. The fact must not be overlooked that an underloaded motor operates at low efficiency and low power factor. Speaking from my own experience, I would much rather operate a motor showing some temperature due to load, rather than a cold motor under loaded, and I have found my hand to be a very accurate instrument for making load tests. The motors of today's design, are very accurately calculated, so that for a given rating in horse power, very definite efficiency and power factor can be obtained in its operating range.

Transmission

In laying out the transmission of electrical energy throughout a plant, economies can be effected and losses eliminated. The cables which make up the circuit, should be of sufficient size to carry with minimum loss, their respective loads. They should be arranged in such a manner that trouble on one circuit would not cause outages on a number of other circuits or machines. I like the idea of separate feeders to each department. Care should be taken to see that these main feeders are properly protected with current rupturing devices, such as oil circuit breakers or switches that can be opened with current operating mechanism. Where these circuits subdivide to feed various machines, fuses should be installed of sufficient size to take care of short circuits only. The individual motor fed by the circuit, should be protected with a current limiting device that will open all lines feeding the motor so as to prevent single phasing and the subsequent burning out of a motor which very often occurs when fuses are used. By using this type of protective device, outages are brought to a minimum and no time is lost hunting up a fuse or the electrician to install the same.

There are several methods in use to allocate power costs to various departments. Probably the most common in practice, is the "guess" method, which is by no means satisfactory and a good deal less accurate. The ideal condition is obtained when the plant is equipped with a graphic meter recording both demand and integrated total loads, and each department metered with an integrating meter with maximum demand indicator. In any case, some sort of metering method should be employed in order to obtain any reasonable amount of accuracy. Where separate feeders are supplied to various depart-

ments a portable graphic meter can be inserted in the circuit, and a graphic chart taken over a period of time or an integrating watthour meter with a demand attachment can be used and the characteristics of their various loads recorded, the maximum demand which each department creates can be set off against the total plant demand and the department charged with its correct proportion of this demand. Such a record as obtained is most valuable to detect departments that are responsible for demands and will materially assist in arranging production programmes. The watthour consumption should be obtained and this cost calculated and proportioned out of the total. The sum of all feeders should equal the total plant watthour consumption.

I have tried in this discussion to suggest some power cost economy. The three factors which enter into power cost, namely maximum demand, load factor, and the resultant diversity factor, are the solution to the problem. It is most essential to hold the maximum demand at a point where the unit cost, or average K.W. hour cost is reasonable, and at its minimum. It is important to maintain a high load factor in order to obtain the greatest watthour consumption on a minimum peak. As pointed out, load control lends itself excellently to this end. By the introduction of electric heating that can be arranged to be used off peak and at variable quantity as other production load varies, or if sufficient processing can be gone on with and held in reserve. The same would apply to pumping or other operations. It is sometimes possible in a plant to arrange a production program, so that the several departments alternate their power requirements. It is essential to operate a plant at as high power factor as possible, and thus conserve the resultant losses as well as the penalties levied by the distributing company for low power factor. Check loads on all motors and if found to be underloaded, it may be possible to interchange motors so that fully loaded motors can be obtained. It is important that modern protective devices be used to decrease interruptions in production, due to blown fuses and damage to equipment. Proper maintenance of equipment is an important economical factor.

MEETING OF STE. JEROME CHAMBRE DE COMMERCE

The members of the Montreal Chapter have not forgotten the reception tendered to them by the industries of St. Jerome two years ago. In the Spring of 1931, the Chambre de Commerce de St. Jérôme held a successful dinner-meeting, at which our late friend Geo. C. Leroux was the speaker.

On December 6th, 1932, another dinner took place at the Hotel Lapointe. The large dining room was filled to capacity by the "notables" of the town. Mr. Jean Paul Rolland, one of our Dominion directors, was in charge of the event and presided. The speaker was Mr. R. O. Sweezey, B.Sc., M.E.I.C., M.C.I.M.M., president of the Beauharnois Power Corporation.

Mr. Sweezey spoke on the economic aspect of hydro-electric powers in Canada, their relation to the proposed St. Lawrence waterways, their costs and influence over industrial costs. He answered several questions and added interesting remarks regarding the newsprint industry.

Mr. Jean Rolland, president of Rolland Paper Co., introduced the speaker. Mayor Dr. Cherrier and Honourable André Fauteux, ex-Secretary of State, expressed the thanks of the meeting to the

speaker and to Mr. Jean Paul Rolland, with a request to continue this series of lectures at short intervals throughout the winter.

Others at the head table were Dr. Brais and Mr. W. R. Louthood, who could not be prevented from letting out a few words on costs and received a punishment by having to tell the public a few jokes he had just told privately to his neighbour Lorenzo Bélanger.

This is a laudable effort towards decentralization, and chapters should study the opportunities of their neighbouring towns.

COST LITERATURE

RECEIVED IN DECEMBER

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Goodwill be Depreciated, Should? Accountants' Journal, December.

Accounting, Different Phase of. Credit Men's Journal, December.

Standard Cost Layout as Planned for Medium Sized Organization. National Association of Cost Accountants, December 15.

Production Control Methods of Andrews Division of Washburn Company. National Association of Cost Accountants, December, 15.

Jewelers & Silversmiths, Profit Control for Manufacturing. National Association of Cost Accountants, December 1.

Financial Statements, Speeding up Preparation of. National Association of Cost Accountants, December 1.

Municipalities, Cost Accounts as Applied to. The Accountant, December 10.

THE TREND OF PRODUCTION COSTS

Commodity prices, as measured by the Dominion Bureau of Statistics index number which is based on the year 1926, declined from 65.0 in October to 64.8 in November. The following is a comparison by main groups:

	Nov. 1931	Oct. 1932	Nov. 1932
Foods, beverages & tobacco	66.2	60.7	60.1
Other consumers' goods	79.0	78.6	78.3
All consumers' goods	73.9	71.4	71.0
Producers' equipment	89.2	86.8	86.0
Building & construction materials	79.2	77.1	77.1
Manufacturers' materials	62.7	53.0	52.5
All producers' materials	65.7	57.4	57.0
All producers' goods	68.1	60.3	59.9
All commodities	70.7	65.0	64.8

Production Control

BY G. E. STEEL
Sangamo Company, Ltd.

(Before Central Ontario Chapter, October 19, 1932)

The subject of production control is too broad and intricate to form the basis of a single evening's discussion. For this reason I have decided to lay before you the main elements of the control system used by Sangamo Company, Limited, Toronto. This will allow us to consider definite problems and the methods of control actually used.

First let me place before you as clear a picture as possible of our type of Industry and of the extent of our manufacturing set up.

General Clasification of Industries as regards Production Problems

1. **Line Production**
   - (a) **Basic Industries:** Where the plant and equipment is built around a process such as in the manufacture of steel, paper, etc.
   - (b) **Assembly Lines:** Where standard articles are manufactured or assembled, the flow of production being even and of sufficient volume to be practically continuous.
2. **Intermittent Production**
   - (a) **Intermittent Re-occurring:** Where a large number of articles are manufactured in variable quantities using the same machines and equipment and where repeat orders justify the manufacture of special tools and the building up of specifications.
   - (b) **Jobbing:** Where each order is manufactured without the hope of repeat orders. Our type of manufacture would be classified as intermittent re-occurring.

Our Production Problem

A brief description of the Sangamo Company will be necessary to make our problem clear. Our plant is one of three factories located in Illinois, England, and Toronto, Canad a. Of necessity, our methods, controls and reports follow a similar form at all plants in order to make comparisons of value.

Due to customs' duties and the necessity of supplying equipment of special nature, each plant is practically a complete unit in itself. For instance, we manufacture at Toronto approximately 97½% of our product. Only 2½% is purchased from our associattd company. While our plant is comparatively small, we handle approximately 10,000 individual items or assemblies Operations performed on these parts would be approximately 35,000. Yearly quantities vary from unity to 2,000,000 pieces of individual items. We believe in straight line production where possible and have small units scattered about the plant wherever our maintained production will justify it.

Our main line of manufacture is electricity meters. These are sold in many variations and styles. Over the year we sell from 500 to 800 different styles of instruments. These vary from standard instruments where the turnover is fairly rapid, to special jobs where only an occasional unit is sold. Competition, however, has forced us to carry a stock of parts for each. Practically any of these items may be built on short notice. In many cases delivery from stock is

necessary. Only in those cases where units are built to order, as in export work, can we neglect our stock of parts. We have not the advantage of working to a pre-arranged schedule.

Points at which we strive to control production:

(1) Control of finished stock.
(2) Control of parts in finished parts stock.
(3) Control of parts in process.
(4) Control of raw stock and consequently purchasing.
(5) Control of repairs.
(6) Control of salvage.
(7) Control of costs by standard cost system.

(1) Control of Finished Stock

Finished stock of meters ready for shipment to customers is controlled by minimums laid down by the sales department and maintained by the production department. This is done by means of a weekly shortage report showing the number of each type of meter which is down to or below minimum. The production department authorizes the assembly of enough units to correct this shortage. In times when sales are good, a maximum is used and the stock is built up to this higher figure. In times when sales are slack, the stock is held close to or slightly under the minimum. These minimums are not arrived at by the usual means, as average sales over a period do not bear much relation to the size of order we are expected to ship from stock. The minimum is then made large enough to cover a reasonable size of order or group of orders to be filled at once; always with the time factor for replenishing the stock taken into account.

(2) Control of Parts in Finished Parts Stock

We have established a finished parts stores which acts as a counting station for the receiving of manufactured goods; and for delivering parts to the requisition department. Our perpetual inventory of goods in the stores is kept in stock ledgers in the production department rather than in the stores department. All requisitions from or deliveries to the stores are serially numbered daily and turned over to the ledger clerk for entering. We use ledgers, as the information contained in these is used for several purposes. Records in the ledger are available to more than one person in the department without the loss often caused by the use of cards.

Minimums are maintained on each item in the stores ledger. This minimum, however, is used as a danger signal and is not necessarily the ordering point. A record of each item below minimum is taken when entering in the stores ledger. This record is checked with material in the shop or on order before any action is taken to replenish the stock.

Work in the finished stores has definite daily peaks, and these are easily charted. These peaks are practically always caused by requisitions for material urgently required in the shop. Delays in securing material are costly. We have been able to reduce our staff and speed up deliveries by putting up our small parts in standard packages with the aid of counting machines during slack periods in the day. We generally use paper bags. Each bag is labelled with the piece number, amount, date of receipt in stores and manufacturing order number. This accomplishes several advantages:

(a) Small parts are generally requisitioned out in standard quantities, so that no time is lost in filling orders.
(b) Inventories are quickly taken.

(c) The information on the package allows old material to be used first and allows defective material to be segregated, if necessary.

We carry only one set of inventory records. Some time ago we found it advisable to remove the record cards from stores contol. It is human nature for the stores keeper to use the information on the card in filling an order. Thus, if the card called for 10,200 parts and he had a requisition for 10,000, he would count out the 200 and send out the remainder. By removing this record the requisition is filled correctly regardless of the remainder.

This record must be regularly checked and any errors corrected. Each week the ledger clerk sends a list of parts to the stores keeper asking for a dated inventory. This is checked at once with the ledger and errors corrected. In this way the total number of items are covered by inventory twice each year.

Control of Obsoleted Parts

Obsolete parts may be divided into two classes:

(a) Parts that may be sold for repair, or replacement parts over a period of years.

(b) Parts that have been superseded and that will not be required for replacements.

We carry separate ledgers for these parts and hold the parts in stores in separate locations.

During the early spring and early fall, stores records are gone over and parts no longer considered quick moving are removed from the stock ledgers and placed with the repair or obsolete stock records. A list with the values shown is given to the comptroller when taken and the loss written off at his discretion. In taking our yearly inventory these lists are separate.

(3) Control of Parts in Process

Parts in process, being scattered throughout the shop, necessarily provide us with our greatest problem in control. This problem is many sided:

(a) It is necessary to keep operators continuously busy, otherwise lost time can become a considerable item.

(b) Enough standard items to supply the main assembly line must be produced and delivered to the assembly line daily.

(c) Special work must be rushed through superseding parts already in process.

(d) In a plant similar to ours where machinery is used for a great many different operations, bottle necks are numerous. These must be watched carefully so the right material will be produced first.

(e) Due to this same condition plans must be changed very often to suit requests from the sales department.

(f) Repair work must not be allowed to lie around and clog the machinery for production.

(g) Special units built to order call for a large number of small manufactured parts to be manufactured simultaneously and delivered simultaneously to the Assembly Department, etc.

Production control is interested in just these problem. We have tried out production boards, tracing systems, etc., but always the large number of items to be scheduled and traced plugged the system and made it only partially successful as well as very expensive.

The pressing requirement is to have reliable information available with the least waste of time and energy. Our present plan has been fairly successful, although it is only a stepping stone to a still

greater improvement being introduced in our three plants. It has already been worked out in our associated United States plant and work on it is being done at present both in Toronto and in England.

For years we manufactured on the job lot system where each individual order was carefully checked for total material, labour and deliveries. This was costed and became a part of our cost records. The average time to accomplish this was from one month to six weeks after completion of manufacture. Figures thus obtained were of very little value to us except for future cost estimates. As a control they were useless. We are now working with a standard cost system where the cost of the individual operation is of vital importance and we do not worry particularly about our final cost of a given part. This is because we know the operation cost either the same day or the morning after it is performed. These are checked at once and controlled. It is apparent, then, that we have, under the worst conditions, reduced our problem from an error covering a month to an error covering a day.

All manufacturing orders are now issued to control the quantity produced and to give foremen the necessary authority to manufacture. They do not bear particularly on our cost calculations.

Orders are issued by the production department on the following authorities:

(a) Necessary replacement of parts used up and sold. This is obtained from our stock ledger minimums after investigation showing that this particular part should be replaced in stock.

(b) Parts required to fill special orders authorized by the Sales Department.

On all our standard lines we have Lists of Material drawn up showing the essential parts and sub-essemblies as delivered to the assembly department. The list does not include small items such as screws and washers, which are held in bulk and are common to most of our instruments. Once a week the Stores Ledger clerk enters opposite each item on this list the quantity available in the Finished Stores Room. This is entered in pencil and is reviewed weekly.

Let us say that we receive an order for 500 meters from our agent in New Zealand. From the specifications of the meter we know at once what type of material will be required. As this would be of a type which we would not hold ready for shipment, it would be necessary to work from the material list. The first step would be to obtain the latest information from the stores ledgers, then, with the order before us we would pick out the parts which we would require. We would know how many were available in our stores department. By referring to our visible index of work in process we also know what parts we can depend on from that source. Within a period of one hour from the receipt of the order we can give an intelligent minimum time for delivery.

The total number of manufacturing orders in the shop is also controlled by our visible index system. Orders when issued by the production department are entered on a card, given the piece number and name of the article to be manufactured. These cards are arranged serially according to the piece number. As orders are completed in the shop, the information is transferred to the visible index file. Therefore, there is always a clear picture of what manufacturing orders are being worked on. This prevents duplication and is of assistance to the tracer in his work. It also serves as a record of material in process. This information is used on a further form to be explained later.

A copy of the manufacturing order given to the foreman bears information regarding the urgency of the need for parts and the approximate date for completion. At the present time we find it necessary to keep two tracers continuously working on these orders to insure their completion in proper sequence. We are not satisfied that this method is efficient and are, consequently, going over to a scheme mentioned above which we term cycle loading. However, at the time. by the use of our material lists, we have obtained good results. It is only the increasing number and diversity of parts which tends to jam our present system.

We have been considering the advisability of controlling the size of the order by means of formulae. Up to the present time this has not seemed desirable due to the irregularity of the use of parts. There are, doubtless, a large number of the more common parts which we manufacture where this method would be of advantage. At the present time we take into consideration the following factors in deciding on the size of order:

(1) Minimum quantity to give economical manufacture; that is, where an expensive set up must be made we try to run a large enough quantity so that the set up charge becomes negligible.
(2) Probable sales over three months average. Here we attempt to have a three months' stock of parts a maximum.
(3) We consider the value of the inventory tied up.
(4) We avoid bottle necks in the manufacturing line by not tying up machinery for a longer period than necessary with one item. From the other standpoint we put enough through at once so that the machine will be free from that item for a reasonable time and may be used for other work. Of course, all of these items are interlinked and cannot be considered separately.

(4) Control of Raw Stock

Our raw stock is made up of a large number of items, no one item forming a high per centage in dollars and cents. The control here becomes somewhat similar to the control of our finished parts stock.

At one time we attempted to control it by means of minimums covering the necessary period for replenishing each individual item. This was not satisfactory, as it bore no relation to our requirements and was expensive.

Unlike many companies, we place the control of purchasing directly under the executive head of the production department so that a single set of records serves both functions. This allows us to determine our purchases of material from information compiled from finished stock of meters, finished parts in stock, parts in process and raw stock available. We use a large card which has on its face a simple record of the purchase of material. (See Form 1) This is divided into sections showing the original order record, acknowledgment and delivery promise, shipping information, and record of the receipt of the goods. Following this is a simple cost calculation showing the laid down cost of the article together with the variables which make up this cost; thus, discounts, duties, transportation and any special charge shows up in comparison with other orders. This indicates the best source of supply and also the reasons why.

The reverse of the card is more complicated. (See Form II) We show here the main items manufactured from the raw stock together with the quantity of material required per hundred. The remainder

of the card from left to right is divided off into the twelve months of the year. In any given month a record of the raw material in stock, the finished parts available and the parts in process can be shown.

Knowing the probable requirements of the plant for three months ahead, it is very easy to figure whether material is required or not. By means of a steel tab on the top of the card the proper month in which to again check material is shown. This allows us to minimize the work obtaining this information for each month. Our control of the purchasing is obtained directly through the use of this card inasmuch as we do not give authority for gambling in future prices in materials. Our material is taken into raw stores on standard costs with the variance above or below actual, calculated and accumulated. Provided standards are fairly set, this gives a very good check on the efficiency of purchasing. Our greatest variable at the present time occurs in copper and brass products. We attempt to control the setting of standards on these materials by relating it to the base cost of copper.

It has been our aim to cut out duplication of recorded information wherever possible and at the same time to so co-relate different records that their relation to each other is quite apparent. We have also endeavoured to make the record self-explanatory.

(5) Control of Repairs

In a large plant where a repair department may be maintained, repairs do not greatly affect production except in the curtailing of volume. However, in the small plant with a large number of different processes, repairs must be taken care of in each department. It is very easy to allow repairs to accumulate under benches—and this is often done. However, sooner or later repairs must be made, and are sure to influence production. We accumulate all our repairs by sending them to our salvage department. Our salvage department is not an operating department but is merely a clearing house for all defective material. When a sufficient quantity has been accumulated, a Salvage Order is put through the department where goods were made just as new work would be done. Repair labour can only be charged to repair orders and all time sheets bearing repair labour are initialed by the superintendent before being honoured for payment. As the foreman must have this authority to do repair labour, we are able to control it within reason.

(6) Control of Salvage

All defective parts are delivered to salvage clearing house and their full cost charged to the salvage account. If anything can be salvaged from these parts of a value equal to the cost of the labour spent to save them, it is done. The salvage department is charged with such labour and credited with the complete parts saved. While this does not in itself control the manufacturing of defective parts, it does give us a continuous check on their total value and a record showing where such loss originates. This becomes a definite factor in our foremen's bonus system.

(7) Control of Costs

In a manufacture such as ours material does not generally form more than twenty-five per cent. of the cost of an article. The greatest savings can consequently be made by watching labour costs very closely. Our standard cost system appears to give us the required control over this. From day to day we know of any variations in the cost of performing any one of the numerous operations. If the cost comes down, we generally have pre-knowledge due to the alter-

CHAR NO. 1

MATERIAL

DETAILS & PACKING

FIRM	ORDER No.	Amt.	Re-quired Date	ACKNOWLEDGMENT Order No.	Amt.	Promised For	Date	SHI Amt.	B

CHAR NO. 2

MATERIAL

DATE	JAN.	FE	MAR.
STOCK IN R STORES			
Amt. Per C.			
Finished S.			
Process			
Estimate of Requirements			
Finished S.			
Process			
Estimate of Requirements			
Finished S.			
Process			
Estimate of Requirements			
Finished S.			
Process			
Estimate of Requirements			
Finished S.			
Process			
Estimate of Requirements			
Finished S.			
Process			
Estimate of Requirements			
Order			

PART NO. NAME

(Originals of these forms are 11 x 8½ thes The

PRODUCTION CONTROL

NO. 1

PART NO.

SHIPPED		RECEIVED		BALANCE			COST					Laid Down Cost
Amt.	By Date	Amt.	Date	Due	Price /c Units		Disc.	Duty	Trns.	Ex.	O.K.	/c Units

NO. 2

UNITS PART NO.

MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.

½ inches The above indicates the headings.)

ing of tools or changing of methods. If the cost goes up, the operator can not make his money on standard rates and is sure to inform us at once. In general. our results have shown us that control of the cost certainly does speed up production and results in work in the plant being cleaned up promptly and efficiently. We know it to be more efficient due to the care taken in laying out an operation time study, and to the absolute need of properly training an operator in exactly what he must do.

As explained previously, we check each time ticket daily against the standard set up for the operations performed. At the end of the week a recap' of all variances from standard is taken. Each foreman is given a memorandum showing the efficiency of his department as compared with standard, and this constitutes a factor in our foremen's bonus system. As a rule the variance is a small fraction of one per cent. of the pay roll over the entire plant. In cases where this is not so in an individual department a thorough investigation is made. A memorandum to the superintendent and the general manager is also made out showing the overall efficiency.

The Making of a Modern Newspaper

By P. J. SALTER, C.A.,
The Vancouver Sun, Vancouver, B. C.

(Before Vancouver Chapter, November 8, 1932)

AS WE pick up our daily newspaper, few of us give any thought as to the process of manufacture of our favorite paper any more than we think of how we get our light when we press the switch on the wall of our homes—just so long as we get these commodities when we need them and we are inclined to accept them as a natural thing.

Our newspaper is a necessity and is almost as essential as the food we eat, certainly as important as our automobile, radio and the many other devices we accept as necessary to our welfare. We keep in touch and are informed as to world events through our newspaper almost as quickly as they take place.

Newspapers are covering a large field of community service. If we need legal advice we may obtain it through the medium of the newspaper, advice about our children, welfare, etc., our financial problems, hints about our gardens, our health, education etc., etc. All these can be secured through our present day newspaper.

The newspaper industry in Vancouver is one that should be considered a valuable asset to our community. The two papers employ over 1,000 men and women exclusive of news boys, news agents and newspaper vendors, and pay out in salaries and wages more than one hundred thousand dollars per month. This amount of money, figured as purchasing power, is interesting to every Vancouver business man.

The two Vancouver papers consume at present about 800 tons of newsprint per month. To make this amount of paper requires wood from about 20 acres of timber lands. 500,000 ft. of timber is needed to make this 800 tons of paper which also requires 21,000 tons of water, 1,500 bbls. of fuel oil, 2 tons sulphur, 3 tons lime rock.

It might be surprising to know how much timber is required to make paper sufficient for some of the larger newspapers. For instance, one issue of the New York Times requires paper made from ten acres of timber lands. This will also give you an idea of the tremendous industry of newspaper manufacturing.

Powell River Company employ about 1,500 men directly employed at the mill, while about 1,500 more are employed in the woods.

The newspaper is one of the cheapest commodities we buy, when taken into comparison with our other daily requirements. The reason for this is, of course, mass production and mass distribution, as for a few cents we buy a newspaper that cost many thousands of dollars to produce.

Heavy Capital Expenditures

Newspapers have been the first to take advantage of mechanical and scientific skill and invention. It has meant heavy and very often burdensome expenditure, but to cope with the element of speed, the first essential in newspaper production, the question of cost has always been considered as secondary.

Forty years ago all the news appearing in the newspapers was set "by hand." Then the typesetting machine appeared on the scene and the whole procedure of production was changed. Wherever it is possible today to set type, machinery is called into action with the result that with the exception of big headings in news and advertising, all the matter appearing in the modern newspaper is the product of machinery.

The same changing hand applies to all departments of the paper, stereotyping equipment, presses, etc., have all been improved until the spectacle of the production of a modern newspaper is one of the great achievements of the day. Just as great a revolution has taken place in the method of collecting and transmitting the news.

In the old days news was transmitted by courier, by beacons, by sailing ships and other forms of ancient travel. It took weeks for news of the battle of Trafalgar to reach England. Yet it was news when the message of victory was received. The successful discovery of America was not conveyed to the Court of Spain until after Columbus had made his historic trip to North America and returned to Spain. Yet the Spanish Ruler heard the biggest piece of news since Roman domination of the world.

Then came the telegraph which quickly circled the world and to-day, the radio. Newspapers were quick to avail themselves of the facilities of the wire, although they paid heavy tolls in the transmission of news. To reduce costs, however, news gathering organizations were formed and hence we have the formation of the Associated Press, the oldest of the news gathering associations in North America, the Canadian Press, an organization of Canadian newspapers, the United Press, the International Press, the Chicago Tribune, and others.

Speed and Costs

Two problems have constantly confronted the news gathering associations—

1—Speed with which to relay messages in their world chain of newspapers—

2—Necessity to keep costs within a scope that could be met by the papers—

In order, as it were, to kill both these birds with one stone, the ingenuity of the modern inventor was again called into service. And Presto! The teletype machine was brought into operation. To-day

the teletype is the ruling medium in the transmission of news. A combination of the telegraph wire and the typewriter, it is used almost solely by all news organizations in laying down news to newspapers.

Two machines are required for the operation, a sending machine and a receiving machine. In the office of the sending machine a boy or a girl types on tape the message which is to be conveyed over the wire. The tape, so punched, is fed into the sending machine and instantly the receiving machine at the other end of the wire, or perhaps, a score of machines in different cities, immediately produces the message, not on tape as sent but in regular typewritten style.

Inventive skill has so regulated the electrical impulses going over the wire that the typewriters mechanically do in less than half the time what trained and expert telegraph operators accomplished. All that is necessary is to keep the sending machine fed with "copy" and at the receiving end to see that the supply of paper in the machine does not fail. There are wire troubles, of course, largely due to weather and outside causes, but in comparison with the quantity of news sent to the various papers and the speed with which it crosses oceans and continents, the proportion of corrections is very small.

Originally the receiving machine was capable of producing only one copy of the message. In order to increase its capacity a specially carbonized paper was prepared to increase the number of simultaneous messages to two. Recently, however, the teletype or printer machines reproduce as many as ten copies at one time solving the difficulties of news bureaus from which news services are distributed to probably as many as four or five members in one City.

While these teletypes have possibly doubled the capacity of news going over the various circuits, carrying around 75 words a minute, they have also tended towards a reduction in cost, though the innovation has been so recent that with the heavy initial costs of installation most of the papers have yet to feel any benefit.

Simultaneously with the general introduction of the teletype the newspaper world is witnessing the passing of the old Morse operator. Morse operators in newspaper offices are like the "Dodo," almost extinct. The great army of wire men have mostly migrated to offices of stock firms but even there the teletype is invading his oldtime territory.

A Manufacturing Business

The modern newspaper is a manufacturing business, an industry, the manufacture being converting raw material "Newsprint" into the finished product, The Newspaper.

The processes entering into the industry are intricate and interesting—and mechanically may be divided into three operations, viz., Composition, Stereotyping, Press Work.

Composition

This is the first step in mechanical operation. Every newspaper contains a certain amount of news and paid advertising, the amount of each being determined beforehand by a dummy showing the portion of space allotted to the editor to fill and the balance being taken up by advertising. All copy is sent to the composing room by a copy boy. The foreman is the supreme head of this department and he apportions the copy to linotype operators and compositors.

The majority of the news in the papers is done by a typesetting machine, and the oldest typesetting machine now extensively used is the linotype, invented by Ottmar Margenthaler, which casts the type in lines or slugs as they are commonly called. The machine is operated from a keyboard similar to the ordinary typewriter, except that the keys are arranged differently.

By a touch of a key the matrix of the character corresponding is released from a magazine channel and is caught by a travelling belt by which it is carried to the assembling elevator, each character for the line including spaces between words being selected in the order in which it is to appear in the line.

The complete line is then carried to a mould and pot of molten metal, and by a plunger metal is forced into the matrices, and the slug is made, afterward being automatically trimmed to the proper thickness.

After the line has been cast, the matrices are automatically carried back to their various channels by a ingenious arrangement of teeth.

The linotype machine is one of the most wonderful achievements of newspaper mechanics, the average production speed is 4,000 ems per hour, but a rapid operator may set as much as five thousand ems per hour which is equivalent to about one thousand six hundred words.

The slugs are then placed together to make up the paragraphs that form the news in the paper, from which proofs are taken. The proofs then go to experienced proof readers who carefully scan the work and correct any mistakes—new slugs are made for incorrect lines, and finally reach the make-up man.

In the meantime men in the ad section have been very busy. Practically all advertising matter and head lines have to be set by hand owing to the great variety of size and style. When the advertising has been sent up and proofs taken and corrected they are also sent to the make-up man.

All materials thus received are made into newspaper form, due regard being given to a proportion, style and effectiveness. The form in which all the type is locked into is in realty a steel frame similar to an ordinary picture frame, the inside measurment being about 19 x 24 inches. These forms as soon as ready are placed upon small steel tables on casters and rolled into the stereotyping room ready for the next major operation.

Stereo Room

The object of the stereo room is to make curved plates of solid metal from the forms assembled in the composing room, and as speed is the vital factor of newspaper production, newspaper printing cannot be done by flat bed presses similar to those used by commercial printing shops.

There are four operations in this department, i.e.,

1. Taking impressions from the forms of type.
2. Roasting the mats.
3. Casting the plates.
4. Trimming & cooling the plates.

The impression of the type is taken by placing a matrix paper on top of the form and under heavy roller pressure by means of a rolling machine the paper is forced into the type in the forms—this pressure is equal to about 75 tons.

The mat mentioned above measures about 19 x 24 inches, and in appearance is similar to cardboard. It is actually made of several

pieces of tissues paper glued together with a specially constructed blotting paper as a base.

The mats come in standard size and vary in thickness from twenty-four thousandths to forty thousandths on an inch according to the needs of the sterotype. These mats must be moistened and as this is a very important factor for good printing, mats may be purchased mill conditioned, that means that the correct amount of moisture has been put in at manufacture, and all the stereotyper has to do is to break the seal when he receives the mats, and place them in a heatless humidor.

The next operation—roasting the mat—is merely under extreme heat taking all the moisture out of the mat and curving in to meet the requirements of the casting box.

The next operation is making the cast for the press. The mat is placed in a machine called the autoplate named because of the automatic operation of casting, sawing, trimming and cooling the cast.

The finished mat is placed in the machine, and molten metal from a five ton metal pot poured on the mat, and the box locked up. One minute is allowed for the metal to set, the box then opened exposing the metal cast which weighs about 40 pounds, the cast then follows the various operations of the autoplate until it is finally trimmed and cooled and ready for delivery to the Press room. Each plate is semi cylindrical so that two when clamped to the press cylinders forms a complete cylinder.

Press Room

Of all the machines used in the production of a newspaper the most interesting by far is the great printing press. Tremendous strides have been made in newspaper presses in past centuries, and as one stands beside the great machine which prints, counts and folds the papers at a rate of 300,000 8 page papers per hour, we cannot help but be amazed at which inventive genius has accomplished in the perfecting of the press.

The machines now used are called web presses because the paper is woven from huge rolls through the presses. There are two types in use today, the deck type and the unit type, the unit type being the most popular because of easy accessibility.

The laying of the plates on the cylinders of the press is very important, as they must be placed correctly so that the finished product will have the correct sequence of pages. The plates are adjusted on the cylinder and clamped tightly together, thus holding them in position, great care must be exercised as a loose plate, if it came off during the run would probably wreck the press and do thousands of dollars worth of damage, for it must be remembered that a modern printing press can cost between one to two hundred thousand dollars.

Rolls of paper are placed at either end of the press, or fed through the floor from underneath. There are usually three sizes of paper, about 68 inches, 52 and 34 inches in height, 30 inches in diameter and weight about 1,000, 800 and 500 pounds respectively. The paper is woven through the press, first it passes over a roller which has spring bearings. These keep the paper tight, but take up the sudden shocks from the rolls when the press is starting, otherwise the tension caused by the large amount of inertia of the roll would snap the sheet. Then passing over steel rollers it goes between the impression and plate cylinders. Here the page is printed and passes directly to the collecting mechanism. Usually presses are

equipped with automatic carriers, which deliver the papers direct to the mailing room automatically counted in fifties.

The mailing room might fittingly be called the distributing station. Here papers for outside points are labelled, bundled, put into mail bags and sent to specified corners, where boys are stationed to deliver them to the homes of many subscribers.

The Editorial Department

A few words regarding the editorial department of a newspaper. I believe every editorial room should have a motto outside inscribed with these words—

"THE SOUL OF JOURNALISM IS DISINTERESTEDNESS."

The function of the editorial department primarily is to prepare news for publication. Of equal importance is the presentation of its views and views of others. Discrimination in news and the manner and style in which news and views are presented constitute the editorial policy of a newspaper.

Every great newspaper has some definite editorial policy and this policy may be reflected in political convictions, in progressive movements and betterments or in other ways in which the paper makes its appeal to the community.

The news gathering machinery of a modern newspaper is one of the marvels of the age.

Large press associations have been organized and are in operation such as the Canadian Press, Association Press, United Press Reuters, and others which span the entire world and as before stated, by the use of cables, telegraph, telephones and radio give a covering of world events and happenings not conceived of only a few short years ago.

The cost of securing this news and bringing it in to the thousands of client newspapers is stupendous.

The costs of rights over cables, telegraphs, telephones, and the use of wireless is staggering, when computed in the imagination of early papers.

These costs are assessed against the various newspapers in proportion to the distance from the distributing bureau, their circulation and ability to pay.

In addition to this every newspaper must maintain a staff of reporters and writers to reflect the occurances in the paper's immediate vicinity. There must also be maintained editors, copy writers, etc., and correspondents in the outlying districts.

Newspapers also spend thousand of dollars annually in picturizing its news presentation.

Necessity for speed in the Editorial department has lead to the employment of staff photographers and the organization and maintaining of cut making plants.

Great care must be taken that news in the paper is correct and authentic and therefore, the services of skilled men and women are necessary. The training of these employees means that they must be constantly on the lookout for something interesting to the readers of the paper and I would like to give you a little instance of how these reporters consider the value of time and news when considered in the relation of subscribers.

Two weeks ago a fire occurred in a lumber yard in South Vancouver. One of our reporters was called at 3.15 a.m. He immediately jumped in his car and without loss of time hurried to the fire. On the way out he collided with another car containing firemen and

the reporter's car was overturned in the ditch. The reporter himself was badly shaken and severely cut his hand but without thinking of himself he got into the firemen's car, which was not badly damaged, and hurried to the fire. He obtained his story, came back to the office and wrote it and then promptly collapsed. This is just an illustration to show how these men regard the importance of getting their story first and quickly.

A column of newspaper news in the type takes approximately 1,500 words. In a paper, therefore, which gives its readers about eighty columns of news means that a total of 120,000 words and often more goes into print daily for reading, quiet consideration and often criticism.

A few words regarding the advertising department of a newspaper. This department is the revenue producing part of the business and some advertising executives are inclined to believe that the advertising they write is just as important as news. Perhaps this is so, particularly to the housewife, it is her household encyclopedia, it apprizes her of bargains in down town stores, it apprizes the autoist of the latest development in cars, the radio fan learns what is new in radio, and so on all down the line.

To be truly effective, advertising must be honest, it must be truthful, the product or the commodity must be as represented, or it acts as a boomerang.

Modern newspapers with vigorous, energetic, enthusiastic organizations are no longer in the business of selling white space alone. They want to co-operate with the advertiser in his efforts to get results and such newspapers spend thousands of dollars annually in merchandising service.

Advertising must produce results or the advertiser stops advertising.

Few organizations on the American continent carry the equipment and personnel to compare with merchandising efforts of newspapers and none equal the newspapers for local contact and knowledge of local market conditions.

The newspaper business would not be complete without an accounting, collection and billing department. These departments however, function along similar lines to every other business and as this talk is not intended to cover any phase of accounting practices I shall not deal with the merits of any particular accounting system applicable to newspapers. Suffice is to say, these departments together with all others, must dovetail and co-operate to the fullest extent so that the whole operation may work along as a unit.

NEW MEMBERS

The following are new members of the Society:

Montreal Chapter

Gentleman, W. J. B., Clarkson, McDonald, Currie & Co., Montreal.

Toronto Chapter

Kennedy, C. E., Toronto Furnace Co. Ltd., Toronto.
Wheatley, N. W., Langleys, Ltd., Toronto.

Hamilton Chapter

Vivian, C. A., Canadian Porcelain Co., Ltd., Hamilton.

Winnipeg Chapter

Thompson, L., Great West Saddlery Co., Ltd., Winnipeg.

Vancouver Chapter

Hill, T. P., C.A., 411 Rogers Bldg., Vancouver.

THE CANADIAN SOCIETY OF COST ACCOUNTANTS AND INDUSTRIAL ENGINEERS

EXAMINATIONS

(Regulations as amended, October 21, 1932.)

A.—General

1. The Society will grant a Certificate of Efficiency in Cost Accounting and Business Organization and Administration to each person passing its two examinations and submitting a satisfactory thesis.

2. The examinations will be held on the first consecutive Monday and Tuseday in May of each year, at such points as may be decided by the Society. The Society will endeavor to hold an examination at any place where there are four or more candidates.

3. Application to try an examination in the following May, may be made up to February 28 each year, on the form provided by the Society.

4. Candidates for the First Examination must have attained the age of 21 years, and must have at least two years' experience in accounting or cost accounting.

5. Candidates for the Second Examination must have passed the First Examination and must have at least four years' experience in accounting or cost accounting, and must be members of the Society, with fee paid in full for the Society's financial year in which the examination is held.

6. Candidates are at liberty to answer questions in either English or French. Good composition and spelling are general requirements.

7. The pass mark for each subject shall be 60 per cent., and the honor mark 80 per cent.

8. Candidates for the First Examination may obtain exemption from subjects a, b or c of the First Examination, by applying for such exemption and furnishing satisfactory proof: (a) That they have passed the Intermediate Examination of any of the following bodies: Any Society or Institute belonging to the Dominion Association of Chartered Accountants; Corporation of Public Accountants of the Province of Quebec; Institute of Accountants and Auditors of the Province of Quebec; Association of Accountants and Auditors of Ontario; General Accountants' Association; or (b) That they have passed equivalent examinations, of which the Society approves, in any of these subjects.

9. A candidate for the First Examination must pass all subjects of that examination within a period not exceeding three years. A candidate for the Second Examination must pass both subjects of that examination at the one time.

10. The fees for examination are: First Examination, one or two subjects $5, complete $10: Second Examination complete $10. The fee must accompany the application, and will be returned if the application is refused, or if an examination is not held in a place which in the opinion of the Society is sufficently convenient for the candidate.

1. Candidates will be supplied with paper suitable for the examinations.

12. A candidate found guilty of any dishonest practice in an examination will be liable to permanent disqualification for examination standing and for membership in the Society.

13. These rules are subject to amendment at any time by the directors of the Society.

B.—First Examination

14. The subjects for the First Examination shall be as follows:

a. Bookkeeping, including double entry, control accounts, columnar journals, closing of books, etc., also simple knowledge of bills of lading, cheques, etc.

b. Accounting, including main principles, capital and revenue, expenditure and receipts, apportionment of expense over departments, and preparation of statements of manufacturing, trading, profit and loss, net income, surplus or appropriation, balance sheets, etc.

c. Law, including main principles of bankruptcy, bills of exchange, companies, contracts, partnership, principal and agent, sale of goods.

d. Cost Accounting, including main principles and records, factory ledgers, distribution of factory overhead, wages, receipts and issue of materials, etc.

15. The time allowed for examination shall be three hours for each of the above subjects.

C.—Second Examination

16. The subjects for the Second Examination shall be as follows:

a. Cost Accounting, advanced.

b. Business Organization and Administration.

17. The time allowed for examination shall be four hours for Cost Accounting and three hours for Business Organization and Administration.

18. Each candidate will be required to mail to the Society's office, within one year from the date of the examination, a thesis describing an entire costing system, including specimens of the principal forms used. This thesis shall be prepared privately by the candidate, and must be entirely his own composition. Two copies must be forwarded to the Society, one entirely in the handwriting of the candidate, and one typewritten. The thesis should not exceed 10,000 words in length.

OUTLINE OF SUBJECTS

First Examination

(a) Bookkeeping

Principles of debit and credit, and the double entry bookkeeping system, including the use of control accounts for subsidiary ledgers, up to and including the closing of a set of books and preparation of trading and profit and loss statements and balance sheets; invoices, statements of account, etc.; bills of exchange and notes; bills of lading and other commercial documents; capital and revenue receipts and expenditures; reserves for bad debts and discounts; depreciation and reserves for depreciation; columnar journals for departmental concerns; cash books, where cash, etc.; banked daily, and where not; imprest system for petty cash; adjustments for interest, expenses paid in advance, accrued charges, etc.; working sheets; single entry.

Books Suggested:

120 Graduated Exercises in Bookkeeping, by Thompson, published by Sir Isaac Pitman & Sons (Canada) Ltd., Toronto. $1.50. Key $1.00. Knowledge of definitions on pages 11, 13 from capital cash receipts to end, 15, 17 from gross profit to end. Knowledge of the uses of all rulings, pages 25, 58.

Accounting, by Smails & Walker, published by Ryerson Press, Toronto. $4.50. Chapters 1-7.

Canadian Modern Accounting, by Sprott & Short, published by Commercial Text Book Co., Toronto. $3.50.

(b) Accounting

Operating Statements and Balance Sheets: Trading, general operating or profit and loss, net income, surplus or appropriation, etc.; current and fixed assets and liabilities.

Partnership: The agreement, various kinds of partners, etc.; various methods of sharing profits and losses; closing off a set of partnership books; admission of a new partner; consolidation of partnership, dissolution and sale to a company.

Goodwill and Its Valuation.

Manufacturing Accounts: Definition of charge-headings and subdivision and grouping; factory ledger and its accounts; closing off the books of a manufacturing partnership and of a manufacturing company; manufacturing statements.

Criticism of Operating Accounts: Methods of comparison of figures for successive periods; cross-checks.

Departmental Accounts: Organization and records required; internal check; distribution of expenses over departments; statements to show results of departments separately; comparison of results of departments operations.

Voucher Register System.

Depreciation, various kinds, etc.

Reserves, Sinking Funds, etc.: Reserves which must be made before net profits ascertained; reserves of profits.

Various Methods of Quotation: F. O. B., C. I. F., etc.

Incorporated Companies: How a public company is formed; directors, shareholders, etc.; public and private companies; limited liability; common and preferred share capital; different kinds of shares, par and no-par value shares; authorized, subscribed, called and paid capital; bonds and debentures, discounts and premiums; capital and revenue profits and losses; dividends.

Books Suggested:

120 Graduated Exercises in Bookkeeping, by Thompson, published by Sir Isaac Pitman & Sons (Canada) Ltd., Toronto. $1.50. Key $1.00. Exercises R to Z, AA, BB and CC. Knowledge of all definitions, pages 11-17. Knowledge of subdivision of statements as per pages 59-61.

Accounting, by Smails & Walker, published by Ryerson Press, Toronto. $4.50. Chapters 1-11 and 13. Chapter 14, pages 192-200. Chapter 21 for section regarding operating accounts only.

(c) Law

A knowledge of Canadian law as related to business, including the following: Contract, partnership, companies, bankruptcy and winding up of companies, bills of exchange, principal and agent, sale of goods, contracts, leases, income tax, sales tax.

Books Suggested:

Canadian Statutes.

Digest of Canadian Mercantile Law, by Anger, published by The Anger Publishing Co., Toronto. $4.50.

Law of Negotiable Instruments in Canada, by Falconbridge, published by The Ryerson Press, Toronto. $2.50.

(d) Cost Accounting

A knowledge of the fundamentals of cost accounting, the essential records, and methods of arriving at cost, including the following:

Purposes of cost accounting; classifications of cost; process cost accounting; specific order cost accounting; manufacturing expense theory; use of cost records; controlling accounts and perpetual inventories; classification of accounts; accounting for materials; material storage and consumption; valuation of materials; accounting for labor costs; accounting for manufacturing expense; distribution of service department costs; distribution of manufacturing expense to production; the cost to make and sell; monthly closing entries; preparation of analytical statements; comparative statements; special conditions.

Books Suggested:

Cost Accounting, by W. B. Lawrence, published by Prentice-Hall, Inc., New York. $5.00. Chapters 1-20.

Business Costs, by Eggleston & Robinson, published by Appleton & Co., New York. $6.00.

Cost Accounting, by Nicholson & Rohrbach, published by Ronald Press Co., New York. $5.00.

Industrial Accounting, by Sanders, published by McGraw-Hill Book Co., New York. $4.00.

Cost Accounting, by Jordan & Harris, published by Ronald Press Co., New York. $4.00.

Second Examination

(a) Cost Accounting

Advanced and detailed knowledge of costing problems, records and practices, and cost of accounting in relation to inventories, budgetary control, and other devices of the various departments of a business, including the following: Job costs; process costs; building up a cost sheet, and accessory forms such as requisition notes, time tickets, perpetual inventory cards, etc.; relation between general and cost accounts; statement of cost of goods manufactured; statement of trading; statement of profit and loss; ratios for management; presentation of costs to management; comparison of costs among competing companies; debatable methods; interest on investment; graphic charts; relative values; estimating cost systems; establishment of standard costs; uses of standard costs; advantages for auditing; uniform methods.

Books Suggested:

Cost Accounting, by W. B. Lawrence, published by Prentice-Hall, Inc., New York. $5.00. Chapters 1-20.

Business Costs, by Eggleston & Robinson, published by Appleton & Co., New York. $6.00.

Cost Accounting, by Nicholson & Rohrbach, published by Ronald Press Co., New York. $5.00.

Industrial Accounting, by Sanders, published by McGraw-Hill Book Co., New York. $4.00.

Cost Accounting, by Jordan & Harris, published by Ronald Press Co., New York. $4.00.

(b) Business Organization and Administration

A knowledge of internal organization, both office and plant, of leading types of business concerns, and the functioning of the various departments, including the following: Legal forms of business; general plan of organization of a business; departmental functions and organization—purchasing, production, advertising, sales, shipping, finance, stores, accounting, cost accounting, credit and collection, engineering, traffic, power, maintenance; executive control; location of plant; design and equipment; office organization and management;

factory organization and management; employment; wage systems; welfare work, development of new products; net profit angle.

Books Suggested:

Administration of Industrial Enterprises, by Jones, published by Longmans, Green & Co., New York. $3.75.

Thesis:

A description, which should not exceed 10,000 words in length, of an entire costing system in a major industry, and including specimens of the principal forms used. It should cover actual costs, standard costs, and budgetary control. A description of costing in a small concern may be accepted if it covers both fundamentals and details.

CHAPTER NOTES

MONTREAL

Reported by R. Schurman, C.A., Secretary.

OPENING DINNER—OCTOBER 21, 1932.

Those of us who carry on the detail of the Chapter activities, occasionally believe that the members at large are not interested in Association Meetings. It does not take long to get checked up on our shortcomings if we omit to make reports of Chapter activities. At our opening dinner meeting on October 21st, we had the pleasure of our General Secretary as a guest. I believe that he enjoyed this function so much that he would like to tell the members all about it; probably he thought the same thing of me, and so the report was lost between us. So many of the members have asked regarding this interesting function, that I am giving this belated report.

The Honourable Athanese David was the guest speaker of the evening. As usual he was in fine form; he told us some good stories and his speech scintillated with wit and humour. Our Chairman, Mr. J. P. Masterson, C.G.A., introduced the speaker, who in rising to address the meeting said "The introduction which your Chairman has made for me, would indicate that I was not baptized with water, but with gunpowder." A brief summary of the address is as follows:

"A moment ago you were addressed by that great French economist, Mr. Romier. He has been with us now for a month, discussing the economic problems of the world, and I am sure that his presence among us will make us think and not despair. He is an optimist to whom we all like to listen, whose deliberations show absence of prejudice, calmness and moderation. He is what all men today must become—a citizen of the world. I trust that he may remain much longer among us.

"Mr. Romier has compared credit in France with credit in our country. I believe that the evil of our times has been on account of bad accountancy. There has been an excess of credit to everyone, whoever he was and wherever he lived—credit for fur coats, radios, gramophones, pianos, diamond rings. A man could buy anything on credit without himself being accredited. The day came when the Banks realized the magnitude of the vast credits extended to individuals, and rightly, I think, have stopped it. What was the result? The man who bought, the wife who bought, the daughter who bought, the son who bought, found themselves without employment, without

funds, without money to pay for the credit that had been extended to them.

"Our neighbor to the South has something which we cannot get, unless we are ready to make big sacrifices; unless we are ready to admit an intensive immigration that would in a few years double our population; unless we admit the idea that in 50 years from now our people shall not be masters of their own destinies. But, we have something that they have not on the other side of the line. Here, our little population of ten million souls is working every day with one idea—creating more employment and looking for the greatness of this country. In our Province of Quebec, only one-third is under cultivation; millions of acres are awaiting settlement; minerals to be discovered and mines to be developed; forests waiting to be hewn; water powers to be harnessed. Although at times we shrink from the pinch of difficult days, we feel no anxiety and no disquietude. We look into the future knowing that our Canadian people have always learned a lesson from every crisis through which they have passed.

"In the past ten years the sciences of biology, physics, chemistry and medicine have made great progress. Why is it, that while other sciences improved the condition of mankind, the economists should have made such a total failure in prognostication of the future? In the so-called good years, prophesies by professors stated that there was not a cloud in the economic sky, and market values would still continue to rise. The world believed. But, when the markets went down the economists were silent. None of them have told us what the next five, ten or fifteen years might bring.

"Mr. Romier however, has come to us with words of hope. He tells us that if, within the next two or three years, Canada will take the opportunity which is offered to it, it may become the big transit country between Europe and Asia.

"In our Province, labour is our most desirable asset.... Those of you who are working for companies employing a great number of men, know why American capital is coming here. It is because capital is not afraid of labour in our Province. In these days of crisis, is there any country in the world where labour is more calm than here in our own Province? Let us therefore treat labour on an equality with capital. If an investor puts say $10,000. in a company, he expects a return of 6% on his capital.... If, the company can earn 10%, then give to the shareholders a bonus of 2% and set aside a 2% reserve for your working men. This is not socialism; this is not bolshevism; this is Christianity!

"Many unkind things have been said against the 20th Century. It has been called the century of extreme industrialization; the century of imperialism; the century of no heart; the century of money. I claim that the 20th century is the first to know how to spend for the good of humanity. More attention has been given to the poor than in any century before. We are in a frame of mind that makes us more ready to lend a helpful hand to those who need assistance. Formerly the total expenditure for charity in the Province of Quebec was $22,000; now we pay over $3,000,000. in a year to the sick, the poor and the orphan.

"Society appreciates the important part which accountants take in the economics today. Formerly everything seemed coming our way. Today, we need not exaggerate optimism, nor need we be pessimistic. Let us realize that we are downhill and that we must go up. The future is to people with energy and will; to those who are unafraid; to those who establish on sane, sound foundations. Let us

think. Let us not be afraid, and let us go Forward!"

The members and guests present numbered about 250. Among those at the head table were:—Mr. Lucien Romier, Economist, Paris, France; Dr. H. Laureys, Dean of the School of Higher Commercial Studies, Montreal; Dean Ira A. MacKay, McGill University; Professor R. R. Thompson, M.C., V.D., A.C.A., C.A., Department of Commerce, McGill University; Valmore Gratton, Professor Faculty of Commerce, University of Montreal; Armand Viau, Asst. Deputy Minister, Provincial Government, Quebec; Mr. R. P. Jellett, President, Montreal Board of Trade; Dr. John W. Ross, President, Canadian Chamber of Commerce; our own popular President, Canadian Society of Cost Accountants and Industrial Engineers, Mr. L. A. Peto.

Our experienced selectors of entertainment, Messrs. Bowden and Blunt, had been visiting all the "Speak Softlies" in the City for several weeks ahead, and the applause which greeted the various numbers on the programme, showed that these amateur producers had made a good job o fit. The "specials" which were provided in the Reception Room, were exceedingly popular and greatly appreciated. Chairman Masterson certainly knows how to pick the favorites.

I apologize to the members of the Association, and particularly to those of our own division, for delay in publication of this report.

DECEMBER 2.

Meeting of the Montreal Chapter, Canadian Society of Cost Accountants, held on December 2nd, 1932, in the Arts Building at McGill University, Montreal, at 8 p.m. Speaker, Mr. Paul E. Dufresne. Subject, "Standardization and Cost Reduction as Applied to Furniture Manufacturing."

Mr. P. E. Dufresne, Industrial Engineer addressed the members of the Chapter on Friday evening, December 2nd.

Members have occasionally complained that the subjects chosen have been too general in character, and not altogether applicable to their work. Mr. Dufresne chose as his topic, "Standardization and Cost Reduction as Applied to Furniture Manufacturing", and showed by his intimate knowledge of the subject the great savings which may be effected in a furniture plant, by adapting methods of conservation of time and material, under the direction of one who knows.

Through the use of carefully prepared charts and graphs, Mr. Dufresne followed the routine of furniture construction from the lumber yard through the dry kiln and the various machining operations—swing saw, planer, matching and jointing, sticker, sanding, assembling, finishing, and the various methods of painting, staining, spraying, to the packing and shipping departments. The members were given ample opportunity for questions and discussion at each of the various stages. This made the lecture exceedingly interesting and practical.

Mr. Dufresne showed how, by adapting labour saving methods, costs in the plant which he used as an illustration, were reduced by $9,000.00 per year.

An attempt will be made by Mr. Dufresne to put his practical talk in the form of a paper, for publication in "Cost and Management". Even though this may be possible, it will lose much of the distinctive personal character of the speaker, illustrating the various points in the explanation of his subject. Mr. Belanger expressed the thanks of the meeting to the speaker. The Chairman, Mr. J. P. Masterson, presided and there was a goodly attendance of members.

This is the last meeting in 1932. The next event scheduled on the programme for the season, is a social evening and smoker. Our

enthusiastic member and Chairman of the Publicity Committee, Mr. H. W. Blunt, C.A., is already planning his programme and promises an exceedingly interesting evening.

VANCOUVER

Reported by Maurice Willis, Secretary.

Our December meeting, thanks to our enterprising Programmes Committee was a huge success, when Mr. G. G. MsGeer, K.C., spoke before an assembly of over 150 people on "National Credit" in the Italian Room of the Vancouver Hotel on Thursday, December 15th, at 8 p.m.

Mr. McGeer's articles published in McLean's magazine have had a national appeal and the Vancouver Chapter feels proud that it has been the first business group to hear Mr. McGeer give a review covering all previous articles and lectures.

The following in part from the Vancouver Daily Province of December 16th gives a resume of the lecture as gathered by one of their reporters.

"Canada is in a position to break away from the present world financial system, based on credits, and through organization of production and wealth, set a most desirable standard of living." Such was a statement of G. G. McGeer, K.C., in addressing Vancouver Chapter of Canadian Society of Cost Accountants and Industrial Engineers in Hotel Vancouver Thursday night. "National Credit" was his subject.

"We in Canada can be quite independent of the rest of the world," Mr. McGeer said. "Ours is a highly educated people, intensely loyal and willing to meet a practical solution of problems in proper spirit. We have an abundance of natural wealth. I propose we start a national monetary system to supervise credit. No banker has ever said a country couldn't use its own credit."

He outlined his plan for a national monetary system by means of a spacious drawing, by which he illustrated how a large national bank, with smaller branches in each province, would utilize credit to build up Canada's resources. Through this system, he contended, the Dominion would also be able to control its foreign trade.

Present systems of credit, inaugurated with the Bank of England Act in 1844, were strongly condemned by the speaker.

"Today the world is suffering from a deliberate scheme to place a group of men in charge of wealth of the whole world by manipulation of credits," he declared.

"This cold, deliberate exploiting by usury is bringing disaster. Our immediate problem is more serious and fraught with greater danger than most people imagine. Man must be protected from this thing which, at first seemingly beneficial, ultimately brings ruin," he asserted.

He recalled that after the Great War the system of credits "struck victor and vanquished with the same devastating force." United States, which was supposed to benefit most from the conflict, is in the same condition as defeated Germany, he contended.

As a background to his discussion of modern financial systems, Mr. McGeer outlined policies of money-lenders since 1844. At that time they decided to substitute credit for money and to stop governments from doing the same thing, he remarked, adding that ever since they had continued along the same lines until an unwieldly inverted financial pyramid had been created.